

REPORT DOCUMENTATION PAGE

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4 different papers enclosed for Task # 78

* Paper Rec'd After 30-day Deadline = 16 days until Deadline) No rush issued

MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO)

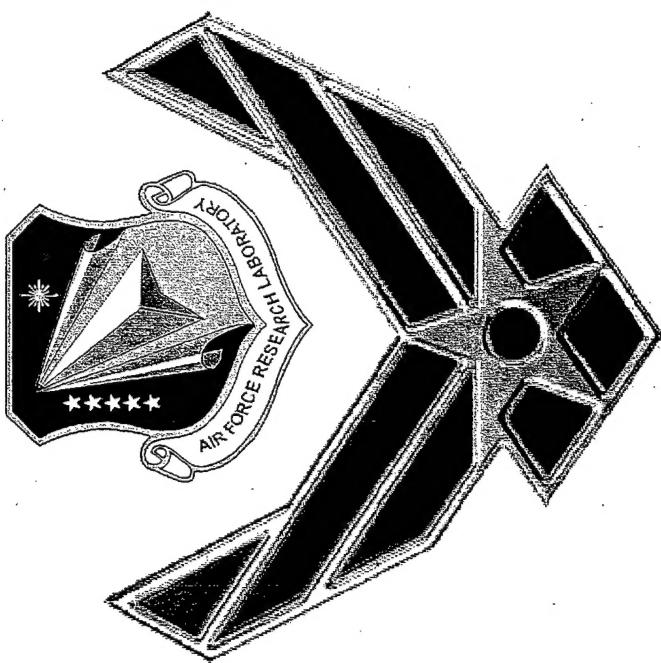
01 Nov 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: AFRL-PR-ED-VG-2002-258
C.T. Liu (PRSM) et al., "Multi-Scale Strain Measurements of a Particular Composite Material"
(viewgraphs only)

ASME Int'l Mechanical Engineering Congress & Exhibit
(New Orleans, LA, 17-22 November 2002) (Deadline: 15 Nov 02)

(Statement A)

Multi-Scale Strain Measurements of a Particulate Composite Material

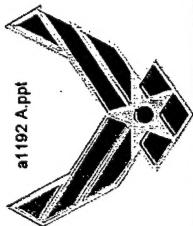


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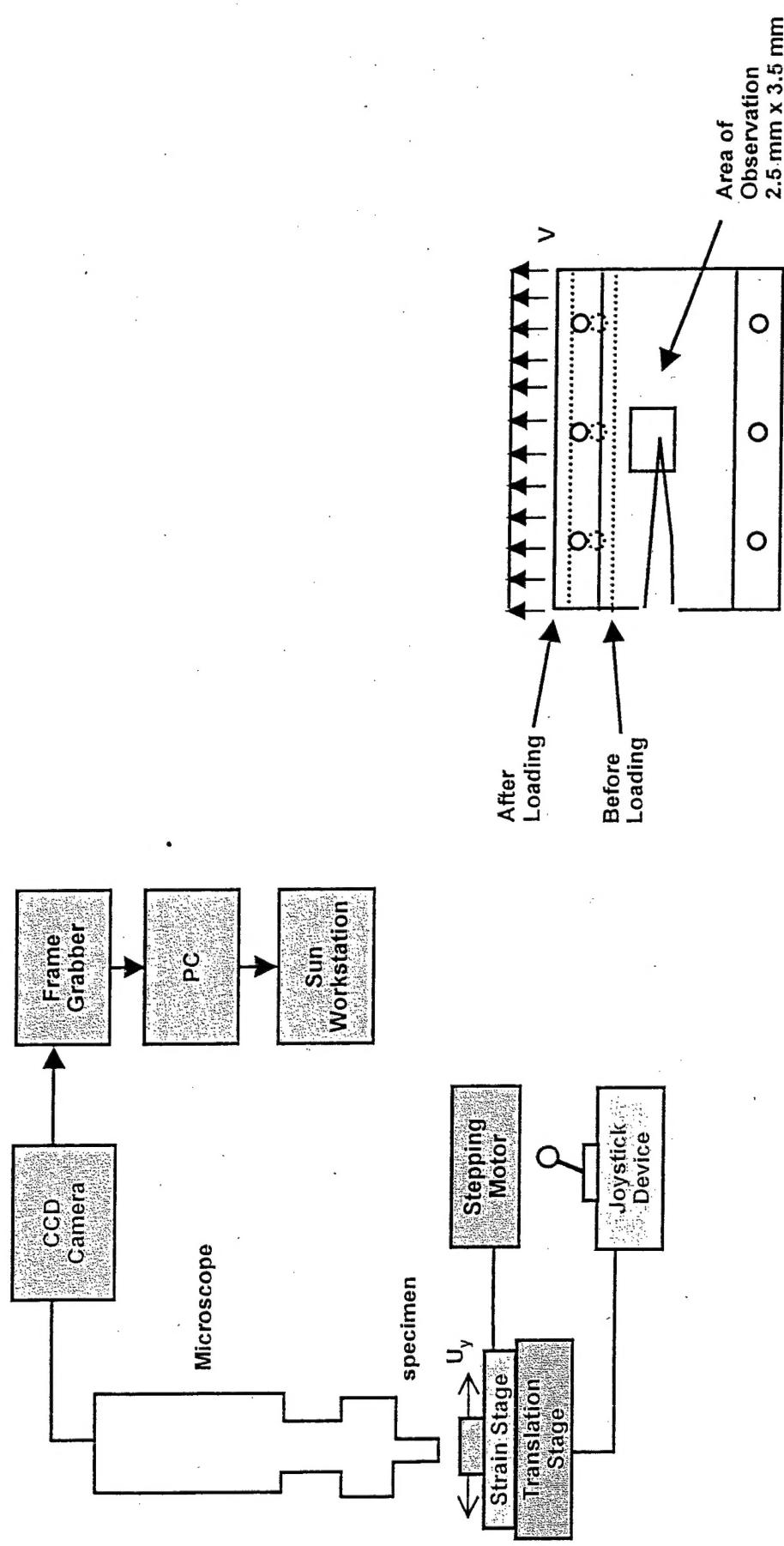
Objectives



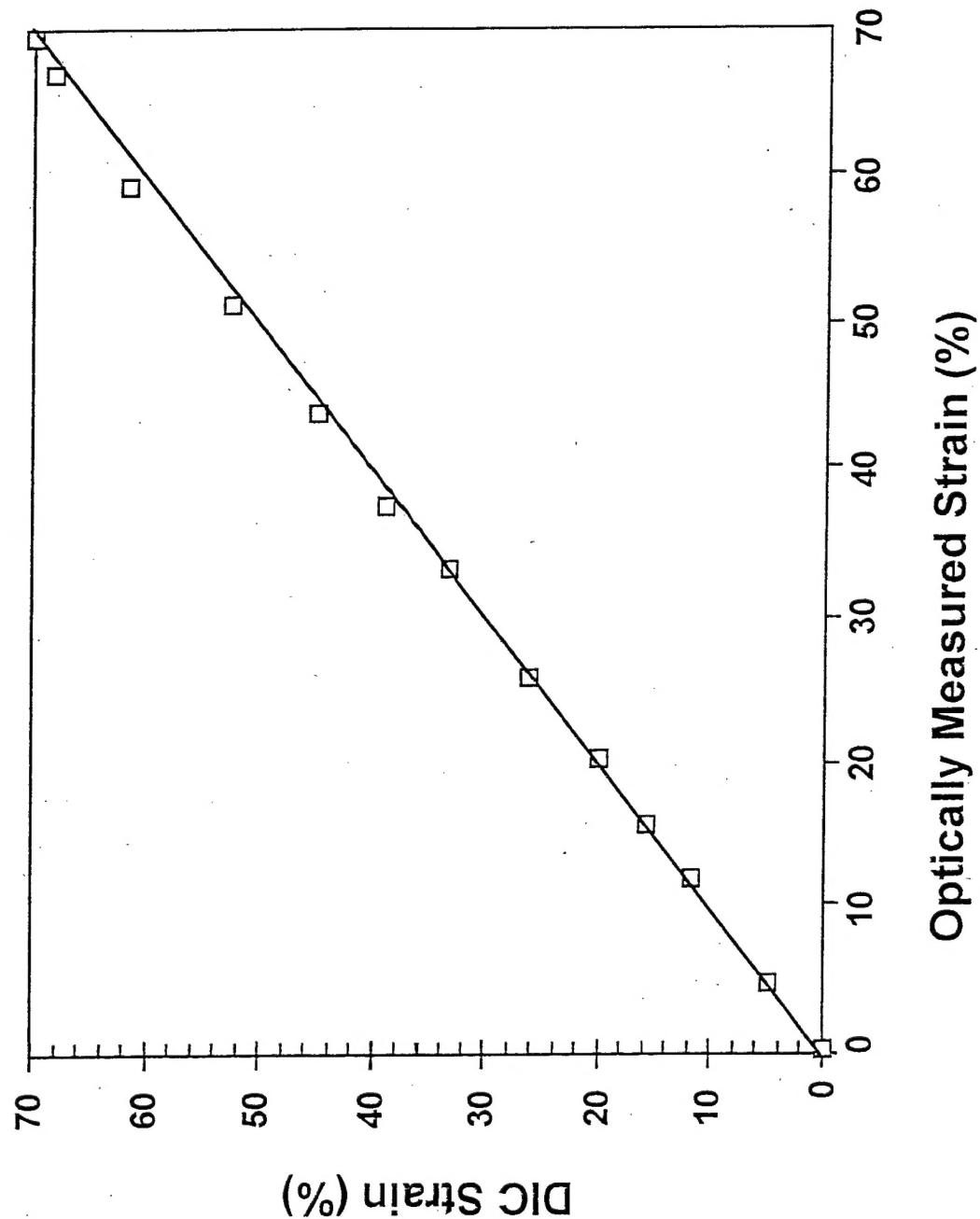
- ¥ Investigate the Effect of Microstructure on the Strain Distributions Near a Crack Tip
- ¥ Conduct Numerical Modeling Analysis to Determine the Displacement and Strain Fields

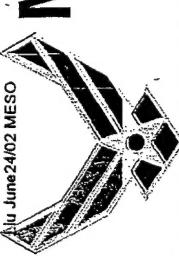


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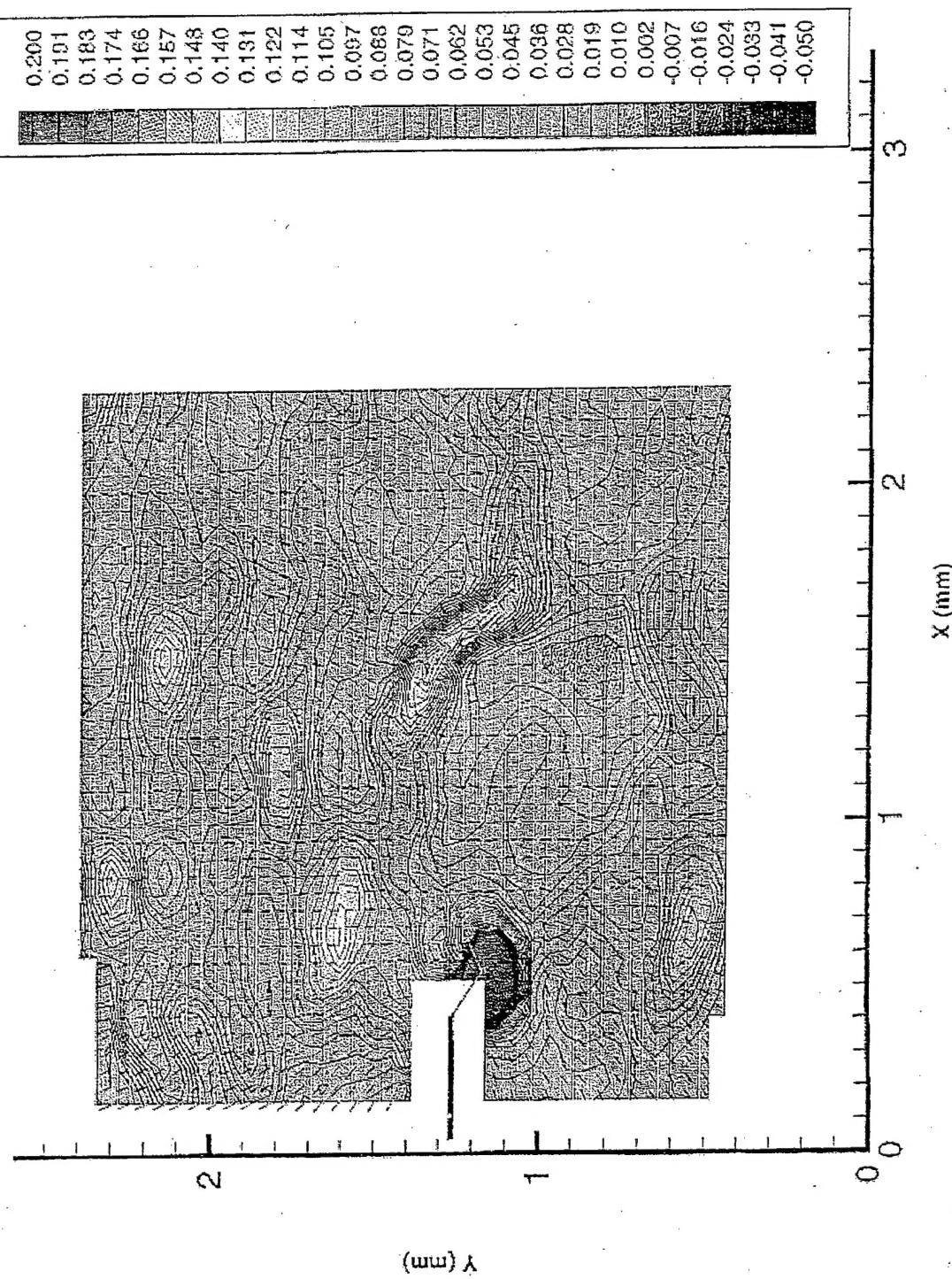
Calibration





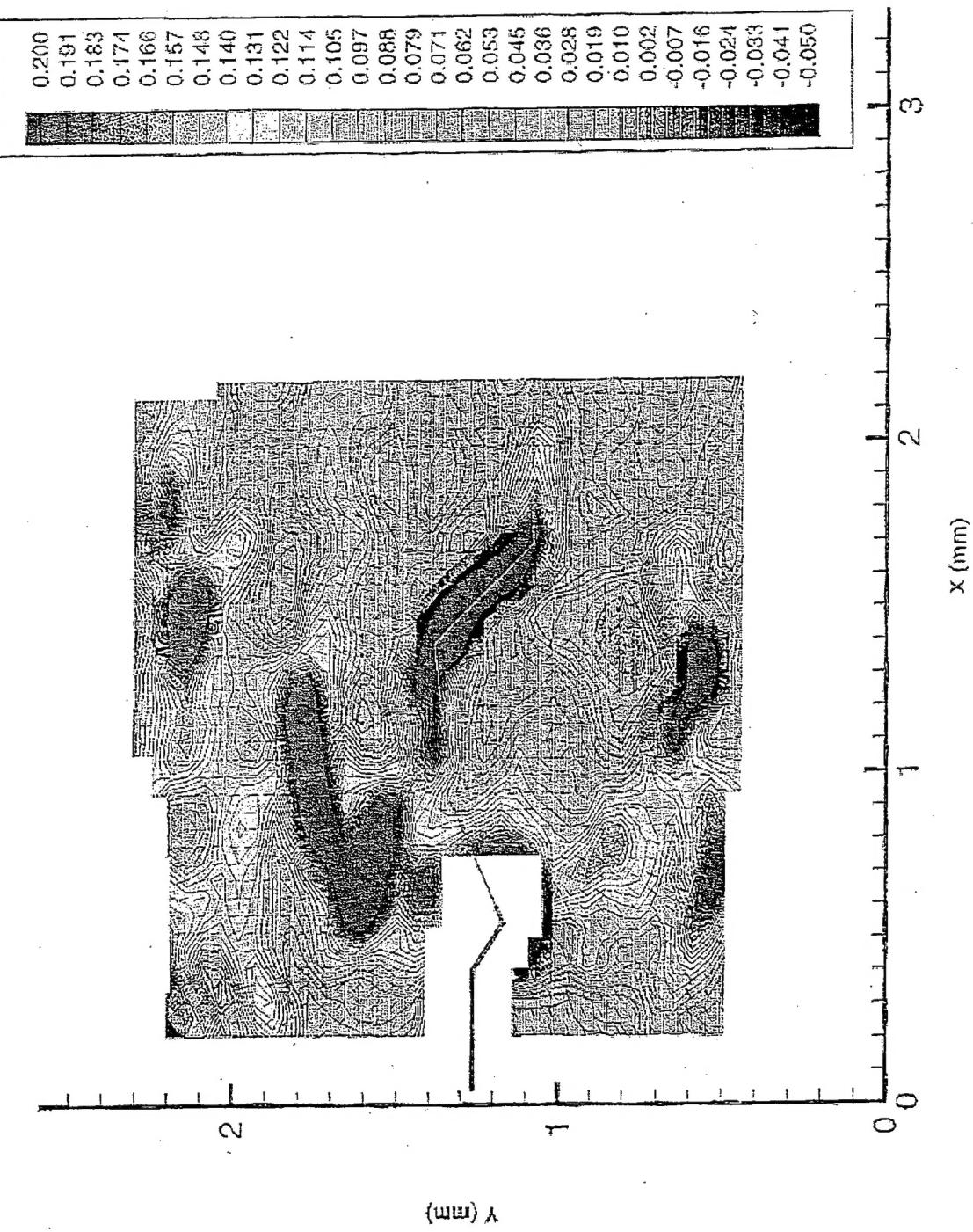
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Maximum Principal Strain Distribution of 6.0% Far Field Strain During Loading



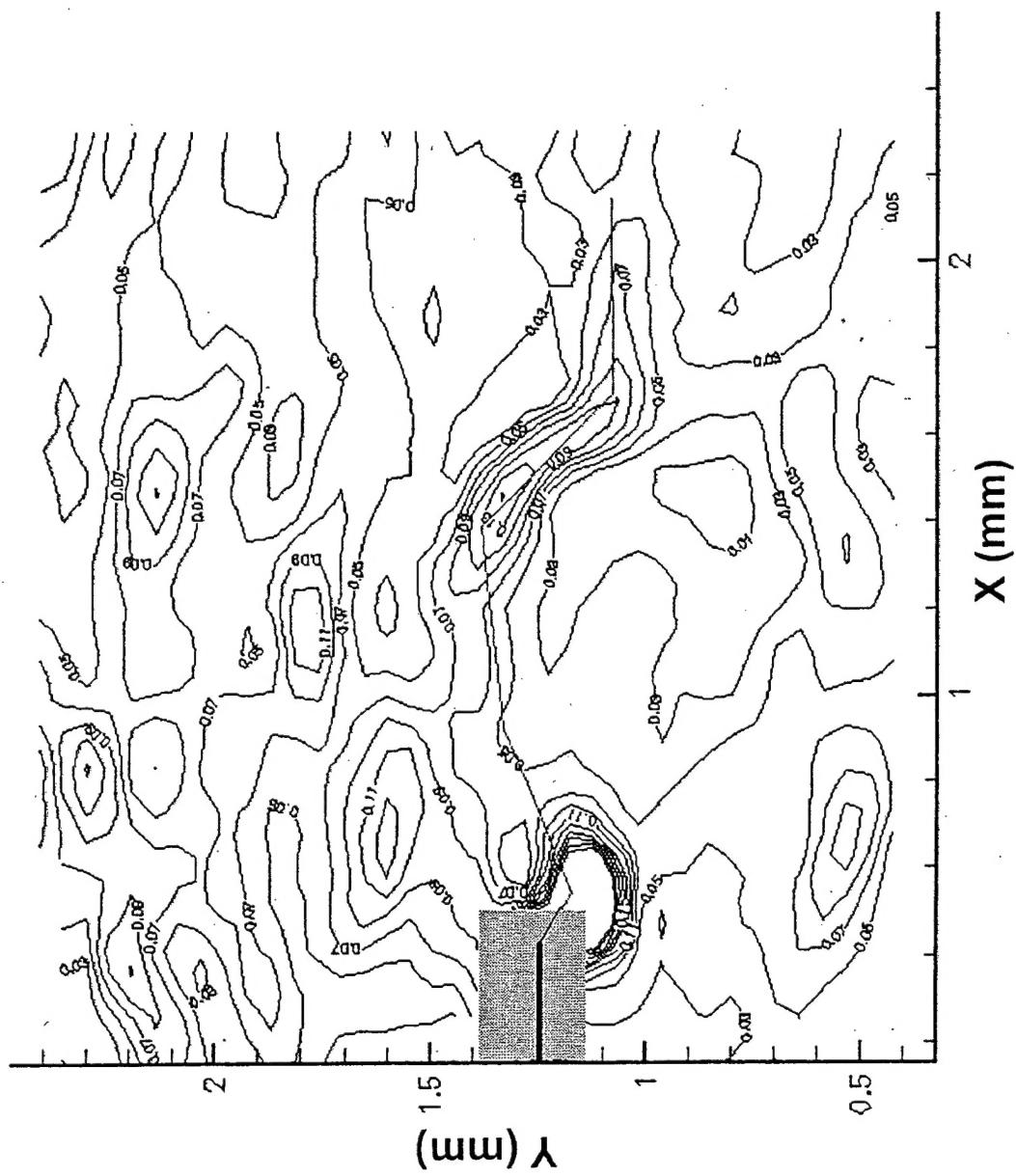


Maximum Principal Strain Distribution of 10.0% Far Field Strain During Loading

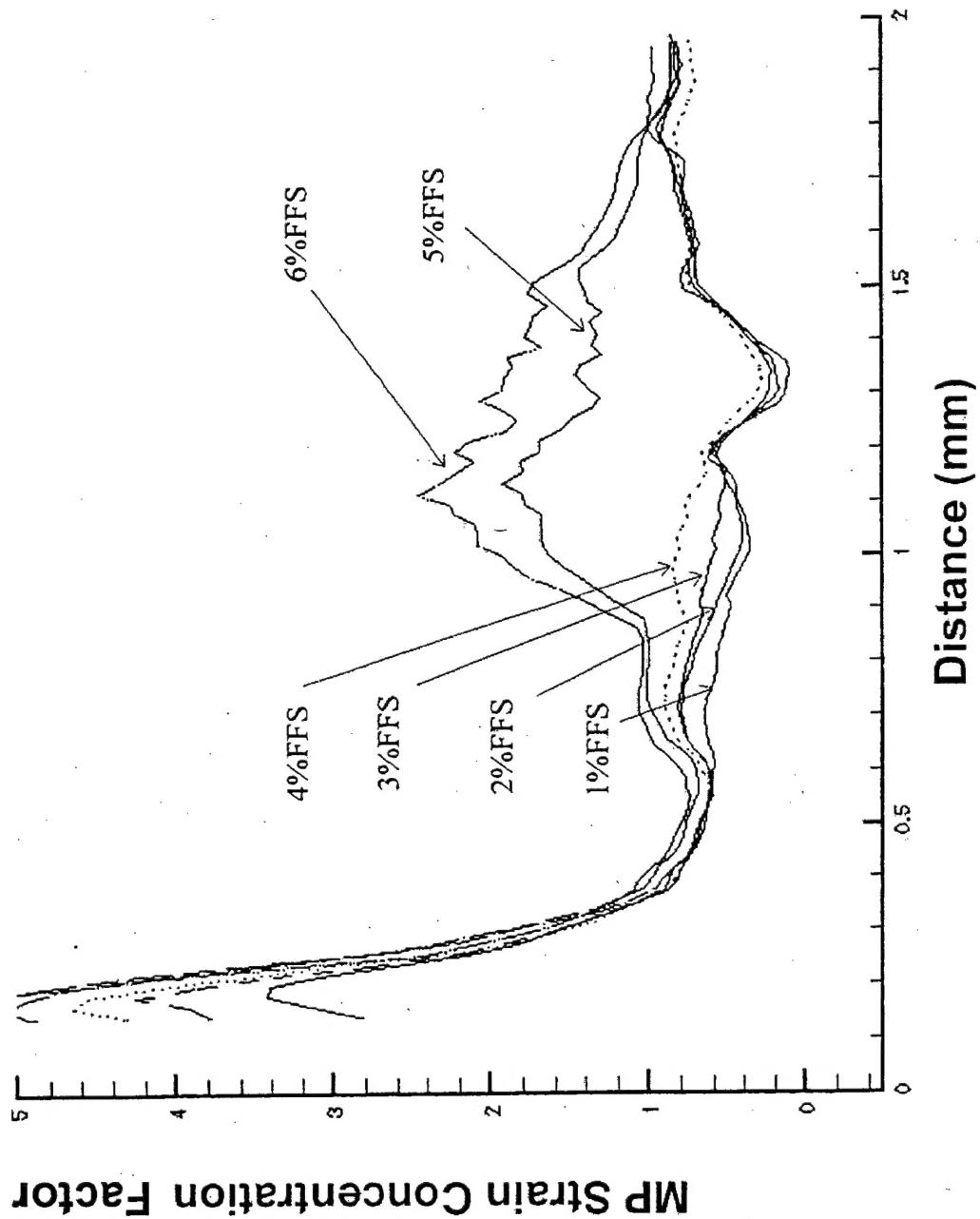
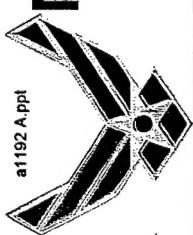


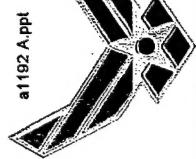


Maximum Principal Strain at 6% Far Field Strain

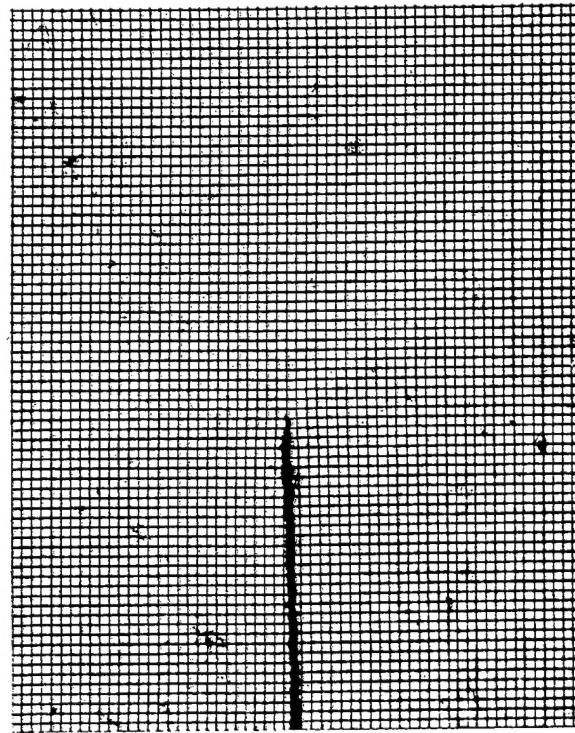


Maximum Principal Strain Concentration Factor at Various Far Field Strain Values

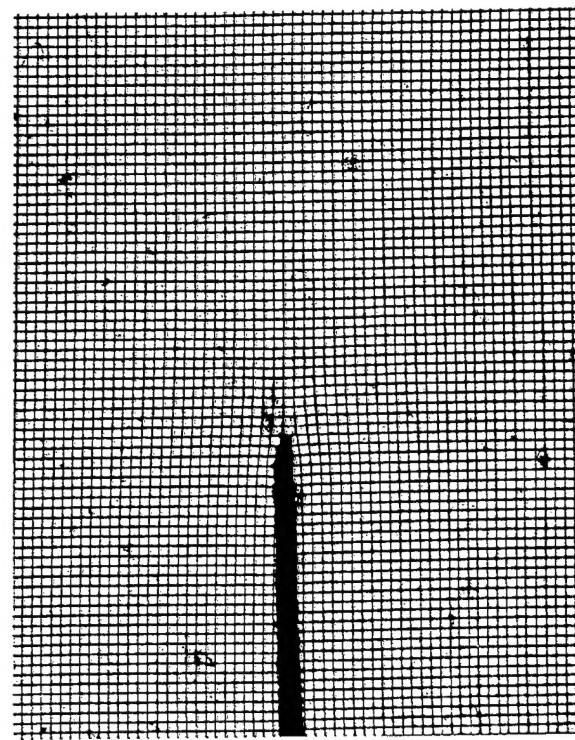




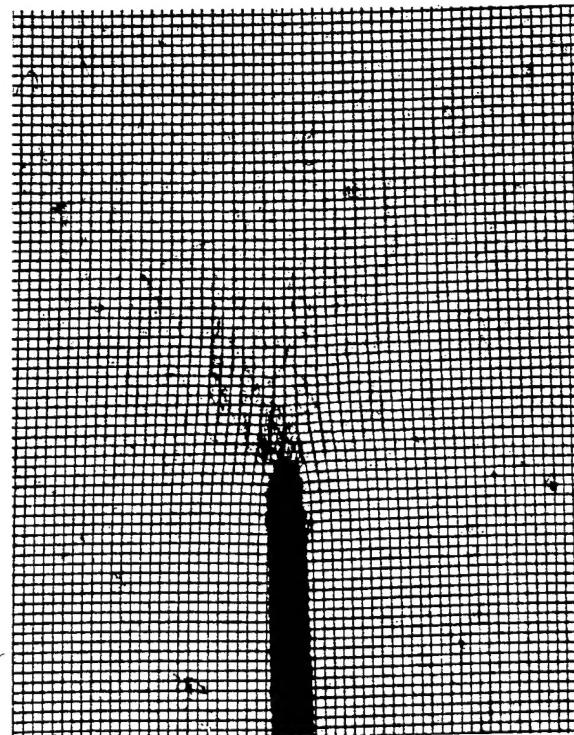
Grid Deformation During the Crack Blunting Phase



a



b

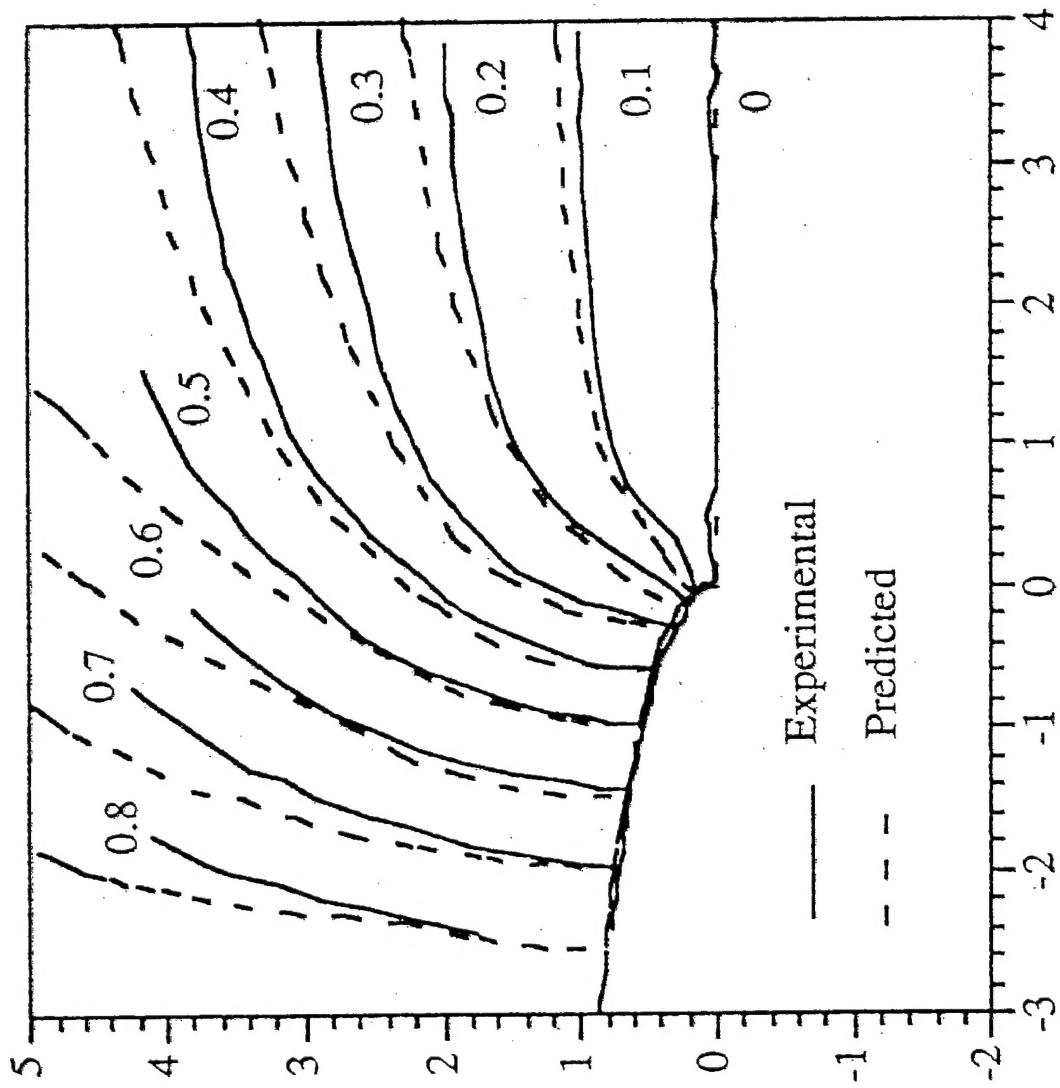


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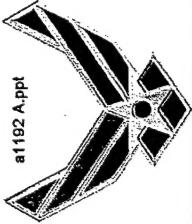
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Contours of Constant Vertical Displacement (V) in the Crack Tip Region

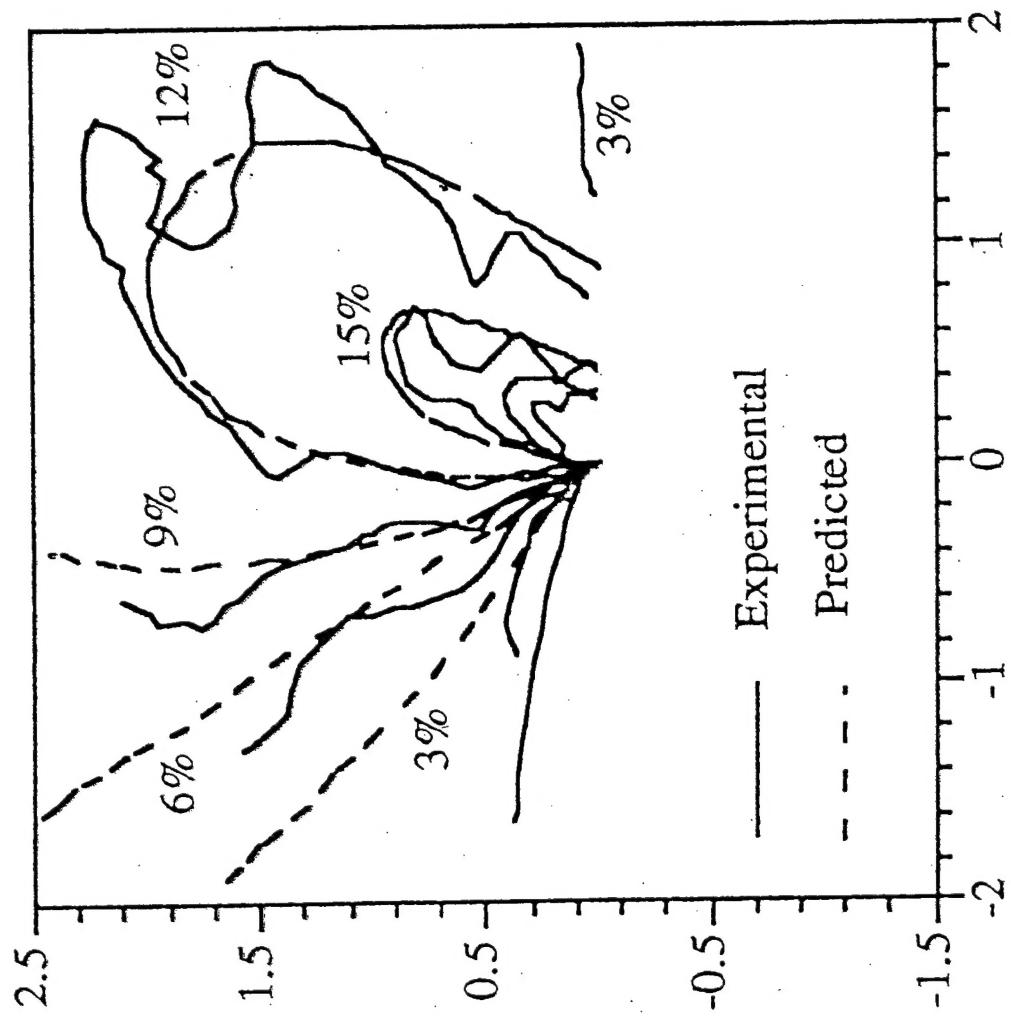


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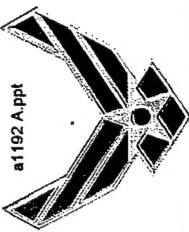
Finite Element Results for a Normal Strain Contours Superimposed Upon Experimental Result



11 X

Conclusions

- ¥ The Microstructure of the Material has a Significant Effect on the Strain Fields Near the Crack Tip
- ¥ The Crack Growth Mechanism Consists of Void Generation and Coalescence with the Main Crack Tip
- ¥ The Displacement and Strain Fields Determined from Numerical Modeling Analysis Compare well with Experimental Results



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